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IN THE

Supreme Court of the United States

OCTOBER TERM, 1979

SIDNEY A. DIAMOND, COMMISSIONER OF PATENTS AND TRADEMARKS, *Petitioner*

v.

JAMES R. DIEHR, II, and THEODORE A. LUTTON, *Respondents*

On Writ of Certiorari to the United States Court of Customs and Patent Appeals

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BRIEF AMICUS CURIAE FOR CHEVRON RESEARCH COMPANY IN SUPPORT OF AFFIRMANCE

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I. AUTHORITY TO FILE

This brief *amicus curiae* is presented by Chevron Research Company under Rule 36.2 of this Court. Letters of consent from the parties are on file with the Clerk of the Court.

II. INTEREST OF THE AMICUS

Chevron Research Company is a wholly owned subsidiary of Standard Oil Company of California and owns the patent application involved in *Diamond* v. *Sherwood,* No. 79-1941. The seismic exploration invention of this Chevron patent application was held to be unpatentable subject matter under 35 U.S.C. § 101 by the Patent and Trademark Office (PTO).[1] This decision was reversed by the United

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[1] The invention relates to gathering and processing seismic data in which events in the gathered field data (side by side wiggly lines) are identified with exact locations of reflectors deep within

States Court of Customs and Patent Appeals (C.C.P.A.) and a petition for a writ of certiorari was filed by the government. The petitioner requested that consideration of the petition be held pending the decision in *Diamond* v. *Diehr and Lutton,* No. 79-1112 on the basis of petitioner's argument that the outcome of *Diehr* will control *Sherwood.*[2] The issues in *Diehr* are related to those in *Diamond* v. *Bradley and Franklin,* No. 79-855, which is to be argued at the same time.

Chevron's immediate interest lies in assisting the court toward correct decisions on issues which may be of importance to Chevron's rights in *Sherwood.* Also the decision sought by the government potentially would impact adversely the validity of many already existing patents and diminish future patent incentives in an important field of technology where Chevron has long been active and where patents are significant.[3]

The issues of interest to Chevron relate to what kinds of inventions cannot, because their subject matter is not

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the earth. Such a process and variants thereof, provide a final pattern of reflectors that precisely indicate likelihood of hydrocarbon deposits justifying the spending of millions of dollars to drill a well. "[Standard Oil Company of California's] first well in Hibernia . . . cost $33 million, the most Socal has ever spent on a single hole, and it was drilled after a careful analysis of Mobil's seismic data. Notes Alexander Massad, Mobil's executive vice president for exploration and production: 'Obviously what their people saw [in the data] was something different from what we saw.'" J. Quirt, "Socal Is Looking Homeward," *Fortune,* March 10, 1980, at 73.

[2] In documents filed in *Sherwood,* Chevron has explained that the alleged similarity is due to the petitioner's incorrect perception of the issues in the case.

[3] "Socal has raised its exploration and production budget again in 1980, and it expects to spend somewhere between $1.7 billion and $2 billion." J. Quirt, "Socal Is Looking Homeward," *supra,* at 67.

embraced within the definition of 35 U.S.C. § 101, be patented even though they are novel and nonobvious. On these issues Chevron supports affirmance of the holdings below to the effect that the subject matter before the Court is within the statute. Chevron takes no position on the novelty or nonobviousness of respondent's invention.

III. SUMMARY OF THE ARGUMENT

It is fundamentally wrong to consider an invention unpatentable solely because a programmed machine is used to carry out the invention and the program for the machine represents an algorithm. Algorithms, as step-by-step processes for obtaining a particular result, have never been treated as *per se* unpatentable. Algorithms carried out by a programmed computer should not be subject to such treatment.

The underlying rationale of the body of case law differentiating patentable from unpatentable subject matter does not lie in the characterization of claimed subject matter as algorithms, computer programs or the like. Two ideas are involved. One is that, although newly discovered, things that have always existed should not be removed from the public domain. The other is that abstract or general ideas, as opposed to concrete solutions to technological problems, fall outside the area of intended operation of the patent system. The granting of patent protection on computer implemented inventions should not be foreclosed on any other basis.

In the context of inventions that involve the use of programmed computers, the C.C.P.A. has attempted to develop a reasoned approach to the initial inquiry required by 35 U.S.C. § 101. Mindful of this Court's prior decisions, the C.C.P.A. approach treats laws of nature, physical phenomena and abstract ideas as though they were a familiar part of the prior art while treating the claimed subject matter as a whole. Parts of claims are not ignored or set aside.

Rather the analysis takes into account the presence of the unpatentable principle or idea in the claim through its relationship to other claimed structure or process steps. The result is consistent with this Court's decisions; it rewards appropriate inventions such as innovative applications of principles to practical uses without removing the underlying principles from the public domain.

IV. ARGUMENT

A. Patentability of Computer Programs Is Not At Issue

The petitioner maintains that the respondents in *Diehr,* in *Bradley* and in *Sherwood* are each attempting to patent a "computer program" and that computer programs are unpatentable. In all of these cases the petitioner has framed its questions in identical "computer program" terms.

This Court has never decided that computer programs are unpatentable. The majority in *Gottschalk* v. *Benson*[4] specifically declined to do so. Likewise, in *Parker* v. *Flook,*[5] the Court refused to so hold. Chevron urges this Court *not* to decide whether computer programs *per se* are or are not patentable, for such a decision is not required by the facts of any of the cases now before the Court. The only common question presented by the facts of *Bradley* and *Diehr* (and *Sherwood*) is whether implementation of a process or machine invention by means of a digital computer, in and of itself, renders the process or machine invention unpatentable subject matter under 35 U.S.C. § 101. Chevron respectfully submits that the answer to this question is, no, and that each case now before the Court must be individually judged not by some unworkable standard based upon the presence or absence of "algorithms", "equations", "programmed algorithms", "computer programs" or the like, but by whether or not each patent application seeks to

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[4] 409 U.S. 63 (1972).

[5] 437 U.S. 584 (1978).

remove from the public domain an unpatentable principle of nature, physical phenomenon or abstract idea.

It is unfortunate that petitioner has made interchangeable use of words that have different meanings. For example, "algorithm', "computer program", "algorithm for a computer program" and "programmed algorithm" are used synonomously in petitioner's briefs.[6] Yet these words are not synonomous.

One must be particularly careful to distinguish between a "computer program" and what the computer does. The computer program is a series of instructions telling the computer how to operate to produce a desired result.[7] The computer can only manipulate binary signals (digits) so the operations may consist of receiving and storing infor-

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[6] *See,* for example, p. 8 of petitioner's brief in *Bradley* where the terms "computer program" and "algorithm" are seemingly used synonomously. Further, on the bottom of p. 13 of the same brief the phrase "algorithm for a computer program" is used. In its *Diehr* brief, the term "programmed algorithm" is used at p. 11. A *computer program* is a series of operational instructions in a language and form that are useable by a computer. An *algorithm,* in general, is a logical series of steps that leads from one point to a desired result. The algorithm in computer terms is not the computer program; it is more akin to the outline for the operations which must be performed by the computer to arrive at the desired result. It may be expressed in words or mathematical formulae but is commonly expressed as a combination of the two. The flowchart narrative and the computer program at pages 17-18 of the Appendix to petitioner's brief in *Diehr* illustrate the difference between a "computer program" and what might be termed the "algorithm" underlying the program. Apparently, petitioner would use the term "mathematical algorithm" to describe steps 33, 41, and 52 of the flowchart narrative. Petitioner seems to use the word "equation", in its mathematical sense, as a mathematical formula. In this sense, "equation" and "mathematical algorithm" may be synonomous.

[7] *In the Matter of An Application by IBM for the Revocation of Letters Patent No. 1,352,742 in the name of Frederick Nymeyer,* decided October 16, 1978 (Appendix A, p. 6a).

mation in a register in the form of digits; receiving and counting a series of digits and transferring stored digits from one register to another on the appropriate count, or comparing the digits in two registers. But in performing these operations, the computer may be amplifying a signal, comparing an actual temperature with a desired temperature or performing a variety of other process steps that are apparent neither from a program listing of the steps the computer performs to complete each task nor from the digital manipulations performed within the computer.

In the context of machine inventions, the Patents Appeal Tribunal of the British Courts of Justice has likened the computer program to "a cam shaped according to certain formulae so that, when fixed into a machine, it controls the latter in a certain way" (Appendix A, p. 8a). A computer with a specific program in it is described as "a piece of machinery which, by reason of the fact that certain perforated cards are placed in it, is constrained to function in a certain way and produce a certain result which is desired" (Appendix A, p. 9a). As such, the British Patents Appeal Tribunal views the computer when loaded with a particular program as "a manner of manufacture" which never existed before.[8]

In reaching this conclusion, the British Tribunal recognized that the computer *per se* was old and that the ideas are not patentable (Appendix A, p. 5a). But it was also recognized that there is a difference between a "computer

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[8] This case and others referred to in it were decided under the Patents Act of the United Kingdom, Patents Act 1949, Chapter 87, Paragraph 101. Recent revision of this Act may or may not have changed the test of patentability under British law (Appendix A, p. 3a), since the Patents Act 1977, Chapter 37, Paragraph 1 declares that a "program for a computer" is not an invention for the purposes of the Act "only to the extent that a patent or application for a patent relates to the [program for a computer] *as such.*" (emphasis added)

program" and a "programmed computer", the former term being something akin to a writing and the latter term being a machine having a fixed mode of operation. In *Diehr* and *Bradley,* however, the petitioner has failed to distinguish between programs, programmed machines and what the programmed machine does (as opposed to how it operates). As a result, the petitioner is suggesting that the Court must decide the issue of "patentability of computer programs". This is a fundamental misconception. The real issue to be addressed is whether in *Diehr* and *Bradley* (and eventually *Sherwood*) the applicants for patent are claiming an abstract idea, a principle of nature or a naturally occurring physical phenomenon, for these are the only categories of *subject matter* this Court has ever declared unpatentable.

B. An Invention Does Not Become Non-Statutory Just Because A Digital Computer May Be Used To Carry Out The Invention

An invention is itself a product of the mind, distinguishable as such from the particular equipment used to practice the invention.

Implementation of a given invention usually can take a variety of specific forms, all of which depend upon the state of technology at the time of implementation. Machine implemented processes for curing rubber and apparatus for controlling the internal operations of machines have always been patentable subject matter. They should be no less patentable when a computer is involved than when the work is done by some other means. The focus in determining patentability should be on what is being done by the machine and not on how it is being done. The C.C.P.A. recognized this when it stated: "The statutory nature of a process or method [or machine] does not depend, under § 101, on the means used to carry it out."[9]

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[9] *In re Diehr,* 602 F.2d 982, 987-988 (C.C.P.A. 1979).

It must be recognized that the programmable digital computer is merely a new tool for doing what was formerly done with specific mechanical or electrical *hardware.* The steps or machine functions performed by the programmed computer are no different from those performed by hardware; they only appear to be different because of the nature of digital computers. To use a programmed computer, the functions to be performed must be described in the language of mathematical operations carried out on data expressed as digits, since the computer ". . . is characterized by its ability to process data, usually by executing mathematical operations on the data at high speeds".[10] Thus, the function of attenuating a signal which, in *hardware,* is accomplished by a fixed arrangement of circuit components (e.g., an attenuator), may be carried out on a digital computer by dividing a number representing signal magnitude by another number representing the desired attenuation. Similarly, the function of amplifying a signal, accomplished in hardware by a fixed arrangement of circuit components (an amplifier), may be accomplished in a digital computer by multiplying the signal (converted to a number so the computer can handle it) by the desired amplification factor (another number). Thus, the operations performed within the computer can be characterized as "mathematical", but to characterize the functions performed as mere mathematical exercises is ". . . misleading because it ignores what the computer is doing, concentrating instead on how it is being done".[11] Signal processing (e.g., attenuating, amplifying, filtering, etc.) is no less a technological endeavor when expressed and performed with digital circuits on a discrete, mathematical, level than when accomplished by fixed "analog" circuits.

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[10] *In re Walter,* 618 F.2d 758, 764 (C.C.P.A. March 27, 1980).

[11] *Id.* at 769.

The petitioner apparently has never questioned the thousands of patents that have been issued by the examiners in the Patent Office on *circuits* or processes carried out by *circuits* that perform signal attenuation or amplifying functions. However, when these very functions are performed by a digital computer under instructions of a program that necessarily expresses these functions in a different form, the petitioner would take these inventions out of the technological arts and characterize them as unpatentable "algorithms", or as "computer programs".

The *Sherwood* case illustrates quite clearly the danger of this biased treatment of computer implemented inventions. Geophysicists have long used seismic techniques to locate oil bearing formations beneath the ground. Patent protection has always been available for inventions in this field.[12] It is only recently as the use of digital computers has become more widespread in this field that the patentability of such subject matter has been questioned.

In the early seismic signal processing patents, fixed arrangements of circuit components (analog systems) are disclosed to perform the claimed methods. In the later patents, digital processing techniques are used. The availability of such techniques seems to have lead to the realization that there frequently is little reason to use fixed circuitry to process seismic signals because the programmed digital computer is faster, less expensive, and more versatile. The process steps applied to this art (sonogramming, inverse sonogramming, etc.) are no more "mathematical" when done on a computer than when done by *hardware*, yet there is no room for a reasoned approach if everything done by the computer is to be ignored as an unpatentable "algorithm" as in petitioner's test.

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[12] We are lodging with the Clerk of the Court copies of a number of patents in the field and the PTO class definitions referred to herein.

The Patent Office classification system officially embraces classes of subject matter relating to seismic signal processing, both with and without computer involvement. Class 367—"Communication, Electrical: Acoustic Wave Systems and Devices"—contains thousands of patents on seismic exploration and contains a subclass (21) entitled "Signal Processing" (for processing signals representative of acoustic waves to identify information in the signals pertaining to underground formations). Class 364—"Electrical Computers and Data Processing Systems"—contains numerous patents in which programmed computers are used in processes including, in subclass 420, processes wherein the data processing system or calculating computer is designed for or used in the study of the earth and/or related sciences.[13] In the official classification definitions there is even a recognition that the nature of a "functional system or element [of a claim]" does not change merely because it "is simulated by a programmed data processor or calculator. . . ."[14]

The Patent Office examiners are prepared and able to examine applications on these inventions. Such applications have long been examined and allowed. It clearly would be wrong to exclude them now merely because the inventions are carried out in practice through the use of digital computers. A more rational approach that preserves

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[13] U.S. Patent and Trademark Office, Classification Definitions, Classes 367 (Sept. 1979) and 364 (June 1977). There is even a subclass of computer applications (subclass 400) defined as "Subject matter under the class definition wherein the data processing system . . . is designed for or utilized in a particular art device system, process, or environment. . . ."

[14] *Id.* See the suggestion that when searching for prior art one should look for functional equivalency of computer elements and:

> "E. Search the class and subclass providing for a functional system or element in addition to this subclass when the functional system or element is simulated by a programmed data processor or calculator. . . ." Class Definitions, Class 364, June 1977, p. 364-3.

subject matter always considered patentable must be formulated.

C. Petitioner Seeks A Rule Of Law That Would Preclude Patentability Of Inventions Implemented Through The Use Of Programmed Digital Data Processing Equipment

What the Patent and Trademark Office seeks in *Diehr* is a decision spelling out how the lower courts must analyze a particular type of invention in determining whether it is of a character such that if new and nonobvious, it might properly be patented.

Consideration of the Patent and Trademark Office brief in *Diehr* along with its statements in *Bradley* and in *Sherwood* provides a fairly clear picture of the rule it wishes the Court to embrace. This would require:

> (1) identifying the component of the claimed invention that in practice would involve the programming and use of digital data processing equipment;[15]
>
> (2) setting aside (i.e., ignoring) the component identified in (1) and examining the remaining portions of the claimed invention in light of the prior art to determine whether any inventive contribution is represented by these portions without reference to the component identified in (1).

If (2) did not reveal an inventive contribution, the Patent and Trademark Office would conclude that the claimed invention was of a nature such that a patent could not properly be granted even if the claimed invention as a whole were new and nonobvious.

Petitioner purports to derive the proposed rule from the decisions of this Court in *Benson* and *Flook*.

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[15] The term "computer" is used popularly with reference to such equipment, but this suggests a connection with mathematics which does not in fact exist. The data processed need not be mathematical data although the manner of processing the data in a computer involves the use of numbers.

1. *Mathematical Expressions of Principles of Nature or Scientific Truths are the Only Algorithms Which Should Be Treated as Being In The Prior Art Under Flook*

In 1890, William C. Robinson in his treatise *Robinson on Patents* described the nature of the inventive act and exhaustively explored the bases for the prohibition against patenting what we now call principles of nature, ideas and physical phenomena.[16] Robinson recognized that everything in the material world operates in accordance with natural forces (principles of nature). He stated:

> "In one sense, the word "principle" denotes the physical force employed by an invention. The other appellations given to this force are very numerous, and most of them are wholly inappropriate. It has been called "an elementary truth," "a principle of science," "a property of matter," "a law of nature," the "root and ground of science;" but the idea which underlies these phrases is sufficiently apparent, and is neither less nor more than that of some natural power or energy, which operates with uniformity under given circumstances, and may thus be contemplated as obedient to law. (footnote omitted). *A principle, in this sense, is a necessary factor in every means which produces physical effects, whether such means be natural or artificial,* and it is generally this which makes the chief impression on the senses of the observer; but it is in itself no true invention, nor can it be protected by a patent." § 135, pp. 193-5 (emphasis added).

The central thrust of the *Benson* and *Flook* decisions was a confirmation, in the context of inventions involving computer technology, that "laws of nature, physical phenomena, and abstract ideas . . . [are] not patentable."[17]

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[16] *Robinson on Patents,* Vol. 1, Section V, §§ 133-143 (1890).

[17] *Diamond* v. *Chakrabarty,* 48 U.S.L.W. 4714, 4715 (June 16, 1980).

As the Court explained recently in *Diamond* v. *Chakrabarty*:

> ". . . Einstein could not patent his celebrated law that $E = mc^2$; nor could Newton have patented the law of gravity. Such discoveries are 'manifestations of . . . nature, free to all men and reserved exclusively to none.' " [18]

Although the Court in *Flook* "carefully scrutinized the claim at issue to determine whether it was precluded from patent protection under 'the principles underlying the prohibition against patents for "ideas" or phenomena of nature'," [19] the petitioner's brief here makes no reference to abstract ideas or laws of nature and does not deal at all with the principles which foreclose patents in these areas. Instead, petitioner has chosen, unjustifiably, to view *Benson* and *Flook* as applicable to everything that might be termed an "algorithm' or a "programmed algorithm", provided only that the algorithm be used in digital data processing equipment.

In each of *Benson* and *Flook* the Court used the term "algorithm" to refer to something specifically described as a "mathematical formula",[20] and "algorithm" was said to mean "[a] procedure for solving a given type of mathematical problem." However, the term is given quite a different meaning in the petitioner's brief here without a clear explanation of either the fact of the shift or the reason for it.

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[18] *Id.* at 4715-16.

[19] *Id.* at 4717.

[20] Note, for example, the parenthetical usage in the *Flook* opinion of "or mathematical formula" to qualify "algorithm": "Reasoning that an algorithm, or mathematical formula, is like a law of nature, *Benson* applied the established rule that a law of nature cannot be the subject of a patent." 437 U.S. at 589.

The invention at issue in *Diehr* does involve a mathematical formula, the Arrhenius equation. But the Arrhenius equation is not the "algorithm" the Patent and Trademark Office wants to have "set aside" (Brief for Petitioner at 7) before a determination is made as to whether the claimed invention is of a type which is ineligible for patent protection even if it is new and non-obvious. The "algorithm" which the Patent and Trademark Office wants to set aside is the series of method steps by which the patent applicant in *Diehr* sought to operate a mold through a specified way of applying the principle expressed in the Arrhenius equation.

This important distinction can be clarified perhaps by dwelling for a moment on the technological aspects of the *Diehr* invention. The patent applicant did not claim to have discovered the Arrhenius equation or that it could be used in controlling a molding machine. Rather, the invention proceeded from a premise that the relationship expressed in the Arrhenius equation could *not* be applied directly to a molding process because real world molds did not in practice operate at a fixed temperature throughout a curing cycle. How then to obtain uniformly cured products in spite of the practical impossibility of duplicating the ideal conditions under which cure time could be computed in accordance with the known relationships governing rate of cure? The *Diehr* answer was a method in which one concurrently (1) kept track of the time elapsed after the closing of a mold and (2) made repeated measurements of mold temperature external of the molded product itself and individual cure time computations based on those measured temperatures. Each computed cure time was in turn compared with the then existing elapsed time until finally there was a match between elapsed time and the current computed cure time, and then the mold was opened so the cured article could be removed.

It is this method, not the Arrhenius equation, that petitioner's brief calls a "programmed algorithm [which] is respondents' only contribution."[21] Thus, petitioner's real premise as to non-statutory subject matter relates not to "law of nature" or "mathematical formula" considerations, but rather to the "fixed step-by-step procedure for accomplishing a given result"[22] which the *Diehr* patent application says should be carried out in practice through the use of digital data processing equipment.

Any doubt on this point is removed by reference to *Sherwood*, which petitioner equates to *Diehr*. Although the invention there obviously is far removed from a law of nature or a mathematical formula, petitioner again calls a process an "algorithm" and contends that it is not statutory subject matter for this reason. The preferred way of practicing the *Sherwood* process is through use of digital data processing equipment but the patent application also describes in detail a system of electrically driven mechanical devices (cams, gears, wheels, etc.) for carrying out the invention. The claims cover both modes of implementation.[23]

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[21] Brief for Petitioner at 11.

[22] Brief for Petitioner at 6, n.12, *Bradley* (defining "algorithm"). Brief for Petitioner in *Diehr*, at p. 7, n. 4, refers the reader to the Bradley brief for this definition.

[23] The *Sherwood* claims at one time were indicated by the Patent and Trademark Office to be allowable, apparently in momentary recognition that the law provides no justification for a distinguishing between electromechanical implementation and digital data processor implementation of an invention. The Patent and Trademark Office still does "not . . . suggest that 'a step-by-step procedure for obtaining a given result' [citing source for this definition of algorithm] necessarily is unpatentable as an algorithm when no computer program is involved. In other contexts, a description of a patentable process could be similarly characterized." Brief for Petitioner at 12, n. 18, *Bradley*. Since a single invention cannot be both statutory and non-statutory subject matter, the Patent and Trademark Office now refuses patents on inventions that would not be challenged except for the fact that digital data

The *Sherwood* invention is a new seismic signal processing system used in locating oil and gas deposits. Within the field referred to as geophysical prospecting,[24] seismic signal processing is an established technology in which inventions have been made and patents have been granted for over fifty years.[25] Its practical importance in these

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processing equipment is the best mode for commercializing them. That which would be viewed as a patentable process if practiced only by electromechanical devices is considered by the Patent and Trademark Office as an unpatentable algorithm if digital data processing equipment is preferred.

[24] *Technology Assessment & Forecast*, Eighth Report, December 1977, Government Printing Office Stock No. 003-004-00550-5 [hereinafter cited as *Forecast*], prepared by the Patent and Trademark Office, outlines the state of this technology with particular reference to the many patents that have been granted and emphasizes its practical importance: "[G]eophysical exploration . . . is an area of wide spread interest and impact. Over $1 Billion was spent in worldwide geophysical hydrocarbon exploration in 1976 alone; reflecting the dependency of most nations on oil and gas (the demand for which is sharply increasing as the supply is decreasing) to supply the major part of their energy needs." *Id.* at 45 (footnote omitted). A copy of this Patent and Trademark Office forecast is being lodged with the Clerk of this Court.

[25] *See Forecast, supra*, at 85-97, for a discussion of this subject matter by Patent Examiner Moskowitz. It was Examiner Moskowitz who rejected the *Sherwood* invention as nonstatutory because it "has as its best mode application by programmed digital computer", professing a belief that "[t]he policy basis for . . . [this Court's decision in *Benson*] . . . precludes patentability where . . . the invention comprises a program and algorithm utilized in conjunction with a digital computer." Petition at 39a, *Sherwood*. The disabling effect of this view of *Benson* on patent incentives in this important technology is attested by Examiner Moskowitz, reporting that "[t]he *Benson* decision resulted in *a dramatic decrease in the number of applications* directed toward geophysical computer programs, algorithms and processing formulae." (*Forecast* at p. 91, emphasis added). Hence, under the Patent and Trademark Office view of *Benson*, crucially important technology which had been subject to the stimulating influence of the patent system now has been withdrawn from the reach of that system.

times of scarce oil is clearly demonstrated by a comparison of Figures 7 and 8 from the patent application.[26] Figure 7 may be viewed as the starting point for the invention, a conventional seismic time section, while Figure 8 represents the new product created by the inventor's distinctive way of combining the many wiggly traces of Figure 7 and shifting ("migrating") portions of the signals to new locations. This new product shows, within the circle added to Figure 8, a "fault" location not detectable at all from the pre-invention Figure 7 material. Locating faults is of significance in finding oil and gas.[27]

Promoting inventions of this type promotes the progress of the useful arts as intended in the Constitution. "The patent laws promote this progress by offering . . . an incentive for . . . inventiveness and research efforts." *Chakrabarty, supra,* at 4715, where the Court adopted the expression from *Kewanee Oil Co.* v. *Bicron Corp.,* 416 U.S. 470, 480 (1974) that "[t]he productive effort thereby fostered will have a positive effect on society through the introduction of new products and processes of manufacture into the economy, and the emanations by way of increased employment and better lives for our citizens."

Chakrabarty also noted as to § 101 of the statute: "The subject matter provisions of the patent law have been cast in broad terms to fulfill the constitutional and statutory goal of promoting 'the Progress of Science and the useful Arts' with all that means for the social and economic benefits envisioned by Jefferson." [28] Recognizing that courts

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[26] These drawings are reproduced in Appendix B. Petition at 1a-63a, *Sherwood,* contains a reproduction of the claims and portions of the Sherwood patent application.

[27] *Forecast, supra,* at 86 mentions faults as one of several "structural features which are associated with accumulations of gas and oil."

[28] 48 U.S.L.W. at 4717.

"should not read into the patent laws limitations and conditions which the Legislature has not expressed",[29] the Court found the micro-organism invention before it to be patentable subject matter: "[The] claim is not to a hitherto unknown natural phenomenon, but to . . . a product of human ingenuity. . . ." [30]

Of course, the seismic signal processing system of *Sherwood* also is the result of human ingenuity rather than a physical phenomenon that had "always existed" [31] but only recently been discovered by man. The seismic traces themselves are brought into being by human action and they are processed in a manner devised by man to product a new technological product (Figure 8) having qualities never present before.

This is not to say, however, that no mathematical equations are even involved in the practice of the *Sherwood* invention. Algebraic equations that deal with elemental phenomena (e.g., speed, reflection angles, etc.) of sound wave movements in the earth are used in connection with some aspects of the invention. Formulae such as these necessarily underlie engineering work of many types. They represent fundamental relationships only, however, and do not tell how the traces from many geophones can be combined and portions of the signals migrated to produce a depth section product revealing fault formations and the like. The *Sherwood* invention rests not upon a relationship that always has existed in nature, but, rather, upon the human application of a variety of operations combined in a particular manner to solve a technological problem. It

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[29] *U.S.* v. *Dubilier Condenser Corp.*, 289 U.S. 178, 199 (1933).

[30] *Chakrabarty*, 48 U.S.L.W. at 4716.

[31] *Flook*, 437 U.S. at 593, n.15: "The underlying notion [why § 101 was not intended to make the discovery of natural phenomena eligible for patent grants] is that a scientific principle . . . reveals a relationship that has always existed."

simply is not relevant to patentability to inquire as to whether man, in addition to devising the process itself, also has devised a mathematical description of it.

Nevertheless, in *Sherwood* as in *Diehr* and *Bradley* the petitioner argues in "algorithm" terminology that suggests a close relationship with mathematics. The "computer-implemented algorithm" [32] is not a mathematical formula at all but is rather an elaborate step-by-step procedure by which the seismic traces are processed. It is, in short, that entire sequence of operations for which digital data processing equipment would be used in a preferred way of practicing the invention commercially.

In neither *Diehr* nor *Sherwood* does the government give any explanation for its attempted application of *Benson* and *Flook* language, offered by the Court in the context of essentially mathematical subject matter, to different kinds of algorithms. However, the real position of the government is exposed in *Bradley* where the PTO "did not . . . direct attention to any specific formula . . . or . . . mathematical calculations . . ." [33] but instead contended that *everything* done by a *computer* (digital data processing equipment) is necessarily a mathematical operation.[34]

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[32] Petition at 7, *Sherwood.*

[33] *In re Bradley and Franklin,* 600 F.2d 807, 811 (C.C.P.A. 1979).

[34] *Id.*

The government repeats this contention in its brief to this Court in *Bradley,* and erroneously suggests at p. 14, n.21, that the C.C.P.A. subscribed to its view in later deciding *In re Sherwood,* 613 F.2d 809 (1980). However, the passage quoted was written in a wholly different context. Incredible as it may seem, the PTO before the C.C.P.A. contended not only that the invention *was a computer program* (and therefore unpatentable subject matter in its view), but also that the patent application failed to satisfy the "best mode" requirement of 35 U.S.C. § 112 because *it did not disclose a computer program* for the preferred implementation of the invention. The passage quoted by petitioner actually dealt with

This contention is without force. That mathematical expressions may be used to describe and characterize the internal operations of digital data processing equipment is meaningless. Words also can be used to describe the same events, and equations can be used to describe all sorts of things. As the C.C.P.A. pointed out:

> "[The PTO] analysis confuses *what* the computer does with *how* it is done. It is of course true that a modern digital computer manipulates data, usually in binary form, by performing mathematical operations, such as addition, subtraction, multiplication, division, or bit shifting, on the data. But this is only *how* the computer does what it does. Of importance is the significance of the data and their manipulation in the real world, i.e., *what* the computer is doing. It may represent the solution of the Pythagorean theorem, or a complex vector equation describing the behavior of a rocket in flight, in which case the computer is performing a mathematical algorithm and solving an equation. This is what was involved in *Benson* and *Flook*. On the other hand, it may be that the data and the manipulations performed thereon by the computer, when viewed on the human level, represent the contents of a page of the Milwaukee telephone directory, or the text of a court opinion retrieved by a computerized law service. Such information is utterly devoid of mathematical significance. Thus, the board's analysis does nothing but provide a quick and automatic negative answer to the § 101 question simply because a computer program is involved." (emphasis in original).[35]

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the best mode contention. The C.C.P.A. was explaining its view that the Sherwood disclosure of an electromechanical system for implementing the invention was so thorough that a person skilled in the art would have no trouble programming digital data processing equipment to accomplish similar operations if desired. The court was not discussing § 101 or what subject matter is eligible for patenting or what operations are mathematical.

[35] *In re Bradley and Franklin*, 600 F.2d at 811-12.

Thus, it will be seen that the subject matter petitioner seeks to have removed from the reach of the patent system is not limited to any of the categories which the Court has heretofore considered to be excluded. There is no justification for concluding that every "step-by-step procedure for obtaining a given result" (petitioner's meaning for *algorithm*) is a mathematical formula, or a law of nature, or a physical phenomenon, or an abstract idea whether in a programmed computer context or some other. Such a conclusion "would have the effect of totally reading the word 'process' out of § 101, since any process is a step-by-step procedure to arrive at a given result." [36] Nor is there any reason for concluding that such subject matter is outside the categories of patentable subject matter defined broadly by Congress to "include anything under the sun that is made by man." [37]

The C.C.P.A. has attempted to develop an appropriate definition of the claim "component" which *Flook* dictates be treated as being in the prior art. The definition arrived at appears to be based on the C.C.P.A.'s observation that:

> "[T]he common thread running through prior decisions regarding statutory subject matter is that a principle of nature or scientific truth (including any mathematical algorithm which expresses such a principle or truth) is not the kind of discovery or invention which the patent laws were designed to protect." [citing, *inter alia, Benson*].[38]

Thus, the mathematical expressions of principles of nature or scientific truths are claim components to be treated as being in the prior art. This should not mean that works of man or manipulations of man-made phenomena, though

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[36] *In re Walter*, 618 F.2d 758, 764-65, n.4 (C.C.P.A. March 27, 1980).

[37] S. Rep. No. 1979, 82d Cong., 2d Sess., 5 (1952).

[38] *Walter*, 618 F.2d at 765.

expressable as mathematical formulae, are to be treated as being in the prior art.[39]

2. *Ignoring Subject Matter Recited In A Claim Is Not Treating That Subject Matter As Though It Were A Familiar Part Of The Prior Art*

The petition filed by the government in *Sherwood,* No. 79-1941, contains a succinct passage that displays the PTO view of how a patent claim containing a reference to non-statutory subject matter is to be examined. Assuming that a "computer-implemented algorithm" is non-statutory subject matter, the petition describes as proper a PTO action that simply ignored the subject matter:

> "[T]he Board properly applied the test laid down in *Parker* v. *Flook:* it set aside the computer-implemented algorithm, found everything else in the claims to be well-known, and concluded that the claims did not recite patentable [statutory] subject matter." (Petition at 7, *Sherwood*).

Similar language is used by the petitioner in describing what the PTO did in *Diehr.*[40]

Page 7 of petitioner's brief in *Diehr* reveals the supposed support in *Flook* for this PTO position to be the passage:

> "Respondent's process is unpatentable under § 101 not because it contains a mathematical algorithm as one component, but because once that algorithm is assumed to be within the prior art, the application, considered

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[39] Thus, for example, in *In re Sherwood,* only mathematical expressions of geophysical principles are treated as algorithms under the *Walter* analysis.

[40] "[The PTO] identified and put aside the computer implemented algorithm in the claims and considered whether what remains is old in the art. . . . It found that everything in Diehr's claim except that algorithm was 'conventional'. . . . It concluded that Diehr was attempting to patent an unpatentable algorithm embodied in a computer program. . . ." (Petition at 8, *Diehr,* No. 79-1112).

> as a whole, contains no patentable invention. Even though a phenomenon of nature or mathematical formula may be well known, an inventive application of the principle may be patented. Conversely, the discovery of such a phenomenon cannot support a patent unless there is some other inventive concept in its application." (437 U.S. at 594).

Of course, we do not agree that what the petitioner labels a "computer implemented algorithm" in *Sherwood,* is at all like what the Court in *Flook* considered to be part of the prior art. The Court was talking about a principle or phenomenon of nature (expressed by way of a mathematical formula), and, the Court stated elsewhere in *Flook* the belief "that a scientific principle . . . reveals a relationship that *has always existed.*" [41] Thus, the Court was treating as prior art only that which had always existed; it was not licensing a trip into a fairyland where new subject matter can be treated as old when in fact it never existed before.

However, the difficulties associated with treating the new as old are side-stepped by petitioner. Instead of considering subject matter as part of the prior art, the only suggestion which could possibly be derived from *Flook,* petitioner proposes to *ignore* the subject matter altogether. According to petitioner, the claim limitations dealing with the computer-implemented algorithm are to be *"set aside"* [42] or *"put aside"* [43] or "separated from the rest of the claim".[44] After the limitations pertaining to the computer-implemented algorithm have been excised from the text, what remains of the claim must then be analyzed.[45]

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[41] 437 U.S. at 593, n.15 (emphasis added).

[42] Petition at 7, *Sherwood;* see p. 22, *supra.*

[43] Petition at 8, *Diehr;* see note 40, *supra.*

[44] Petition at 8, *Bradley,* No. 79-855.

[45] *Id.*

Not even prior art elements are treated so harshly. Old elements are found in nearly all patent claims, and there is no authority for ignoring them. Some, perhaps all, inventions contain *no* new elements, but are rather new combinations of old elements cooperating with one another to produce a new effect of some kind. Petitioner's drastic proposal that one read out of patent claims all those portions which would be implemented by digital computers clearly cannot be tied to the teachings of *Flook*. Although treating phenomena of nature as in the prior art, *Flook* not only failed to suggest that limitations in patent claims to such phenomena be ignored but specifically endorsed the principle that patent claims should be "considered as a whole." [46]

Mindful of this Court's concern for treating claimed subject matter as a whole even where mathematical algorithms are present, the C.C.P.A. has attempted to develop an analysis "to establish the relationship between the algorithm and the physical steps or elements of the claim." [47] This analysis includes evaluation of the claim (including the mathematical algorithm) as a whole, and determining if

> "the mathematical algorithm is implemented in a specific manner to define structural relationships between the physical elements of the claim . . . or to refine or limit claim steps . . . the claim being otherwise statutory. . . ." [48]

This developing analytical format is consistent with *Flook* and appropriately encourages progress in the useful

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[46] *Flook*, 437 U.S. at 594, n.16. *See also* the patent claim in *Mackay Radio and Telegraph Co.* v. *Radio Corp. of America*, 306 U.S. 86 (1939), cited with approval in *Flook*.

[47] *Walter*, 618 F.2d at 767.

[48] *Id.* Thus, for example, in *In re Sherwood*, mathematical expressions of geophysical principles were not ignored but rather were considered in relationship to the recited, stepwise manipulation of man-made seismic signal data which was employed to produce another man-made physical thing—an improved map of subterranean formations such as Figure 8 of Appendix B.

arts by rewarding the innovative applications of principles of nature or scientific truths to practical technological environments, without sanctioning the removal of the underlying principles or truths from the public domain.

D. Specific Processes For Dealing With Practical Technological Problems Are Patentable Subject Matter Whether Or Not Digital Data Processing Equipment Is Used In Their Practice

The fault petitioner finds in the *Diehr* and *Sherwood* inventions is not related to constitutional and statutory provisions. The technologies of rubber molding and seismic prospecting clearly are within the useful arts.[49] It is equally clear that there is nothing in 35 U.S.C. § 101 from which one might conclude that Congress intended to exclude the processing of rubber or the processing of seismic traces from the reach of the incentive system provided by the patent laws.[50]

The government attack springs from terminological confusion that irrationally equates all *algorithms* with *phenomena of nature* (and the other terms, such as *laws of nature, abstract ideas,* and *principles,* used interchangeably with it). *Mathematical formulae* get mixed up in the middle, presumably because *some* mathematical formulae describe prenomena of nature and because *some* algorithms are for solving mathematical formulae. Digital computers get tacked on because of assumed relations with algorithms.

The *Chakrabarty*[51] explanations of *Flook* point to a path through the maze. The limits of § 101 are geared to

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[49] *U.S. Const.*, Arl. 1, Sec. 8, Cl. 8.

[50] The terms of § 101 make "any new and useful process . . . [and] . . . any new and useful improvement thereof" eligible for the grant of a patent "subject to the conditions" of novelty (§ 102) and nonobviousness (§ 103), and the other requirements of the statute. And, 35 U.S.C. § 100 says "process" means not only a process but also a new use of a known process.

[51] *Diamond* v. *Chakrabarty, supra* note 17.

"laws of nature, physical phenomena, and abstract ideas" because these *are* "manifestations of . . . nature, free to all men. . . ." [52] Whether a particular patent claim is directed to nonstatutory subject matter is to be determined by scrutinizing it in light of the principles which proscribe patents for abstract ideas and phenomena of nature.[53] It would violate these principles if it were something that "has always existed" [54] or if it were so general as to be outside the "useful arts." [55] Other subject matter would pass the § 101 test and would then be evaluated for novelty and non-obviousness under §§ 102 and 103 of the statute.[56]

Under this approach the intent of Congress evidenced by the broad language of the statute would be honored and the incentives of the patent system would be restored in areas which the Patent Office now seeks to block off without authorization from Congress.

The approach also would be consistent with the prior holdings of the Court. The Court's concern in this area always has focused on laws of nature. Mathematical formulae (and computations concerning them) have never been considered objectionable outside this context of naturally occurring phenomena that have always existed.[57] Patent

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[52] *Id.* at 4715. *Flook*, it will be recalled, had itself explained that a scientific principle reveals a relationship that "has always existed" (437 U.S. at 593, n.15) and cannot therefore be new.

[53] *Chakrabarty*, 48 U.S.L.W. at 4717.

[54] *Flook*, 437 U.S. at 593, n.15.

[55] *U.S. Const.*, Art. 1, Sec. 8, Cl. 8; 35 U.S.C. § 101.

[56] An early portion of the opinion of the C.C.P.A. in *In re Bergy*, 596 F.2d 952, 960 (1979), presents an accurate explanation of the relationship between Sections 101, 102 and 103 of the Patent Law and the types of evaluations appropriate to each of them. An endorsement by the Court of this explanation would be a major contribution toward elimination of confusion in the law.

[57] *See Mackay, supra*, note 46.

claims with formulae or computation steps are not precluded as long as they represent concrete solutions to technological problems rather than abstract expressions of principles of nature or scientific truths.

V. CONCLUSION

The decision of the court below is correct and should be affirmed.

Respectfully submitted,

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APPENDIX

APPENDIX A

In the Matter of an Application by IBM for the Revocation of Letters Patent No. 1,352,742 in the Name of Frederick Nymeyer

PATENTS APPEAL TRIBUNAL

Royal Courts of Justice,
Monday, 16th October, 1978

Before:

MR. JUSTICE GRAHAM

and

MR. JUSTICE WHITFORD

In the Matter of THE PATENTS ACT, 1949,

and

In the Matter of AN APPLICATION by INTERNATIONAL BUSINESS MACHINES CORPORATION for the Revocation of Letters Patent No. 1,352,742 in the name of FREDERICK NYMEYER.

(On Appeal from the Decision of the Superintending Examiner (Mr. A. L. Pheasey) dated the 19th April, 1977)

(Transcript of the Shorthand Notes of Marten Meredith & Co. Ltd., 36-38 Whitefriars Street, London EC4Y 8BJ.)

MR. T. A. BLANCO-WHITE, Q.C. and MR. P. PRESCOTT, instructed by Mr. Lawrence Perry (IBM), appeared as Counsel for the Appellants (Applicants for Revocation).

MR. G. D. EVERINGTON, Q.C. and MR. N. PUMFREY, instructed Messrs. Stanley, Popplewell, Francis & Ross, appeared as Counsel for the Respondent (Patentee).

DECISION

MR. JUSTICE GRAHAM: Mr. Justice Whitford will deliver the judgment of the Tribunal.

MR. JUSTICE WHITFORD: This is an Applicants' Appeal on an Application to revoke Letters Patent No. 1,352,742

standing in the name of Frederick Nymeyer. The applicants, International Business Machines Corporation (IBM) have a considerable business in the field of equipment used in data processing. This includes apparatus of a type commonly referred to as computers. The title of the patent is "Improvements relating to Data Processing". Claims 1 to 7 are directed to a data handling system, claims 8 to 14 to a method of using a data handling system, claims 15 to 22 to a method of programming a data handling system, claim 23 to a computer programmed in accordance with the method claims, claim 24 to programming means in physical form suitable to programme a computer by any one of the method claims while the remaining claims are for methods of processing electric signals and the signals when processed.

The sole ground of objection argued on appeal was that the subject of the principal claims is not an invention within the meaning of the Patents Act 1949.

The case was listed in the Patents Court but when it was called on a preliminary question was raised as to whether we ought not to be sitting as the Patents Appeal Tribunal. The hearing of appeals from the Comptroller under the continuing provisions of the 1949 Act is dealt with in Schedule 4 of the transitional provisions to the Patents Act 1977. Section 11(3) of Schedule 4 provides that where an appeal has been instituted before the Tribunal before the appointed day and the hearing of the appeal has begun but has not been completed before that day, the appeal (and any further appeal) shall be continued and disposed of under the old law. 11(4) provides where such an appeal has been so instituted but the hearing of it has not begun before the appointed day, it shall be transferred by virtue of this sub-paragraph to the Patents Court on that day and the appeal (and any further appeal) shall be prosecuted under the old law, but as if

references in the 1949 Act and rules made under it to the Appeal Tribunal were references to the Patents Court. This appeal was instituted before and was called on before the Patents Appeal Tribunal before the appointed day. It was then adjourned to be heard before the Patents Judges sitting *in banc*. We are of the opinion that under the transitional provisions the appeal should be treated as having begun before the Patents Appeal Tribunal but as, in any event, it was agreed on all sides that the old law applies the question is of no importance so far as the issues of substance are concerned.

As was pointed out to us at an early stage, the test as to whether an invention is patentable may, on the face of it, have been radically changed by the 1977 Act. We however have to consider the position under the old law. Our decision is a decision under the provisions of the 1949 Act. We venture no opinion as to what the conclusion under the 1977 Act might be. Nor do we think it appropriate to take into consideration in reaching our conclusion any consideration of the possible effects of the 1977 Act or the probable attitude of the European Patent Office to claims in the field which we have to consider in the light of the Guidelines for Examiners in the European Office touching computer programmes which have already been issued and to which we were briefly referred.

The question as to whether all the more far reaching claims should be denied protection has been simplified by the very reasonable concession made on both sides that the matter can be tested on the first claim in the Patent under consideration.

The decision under appeal sets out on pages 1 to 3 the nature of the data processing with which the specification is concerned so clearly that we shall not attempt to improve upon it. We agree that it is plain that this patent derives from an idea Mr. Nymeyer conceived as to the

best way of determining a selling price for, for example, a stock or share namely that this could best be done by an automatic computation involving a comparison of buying orders and selling orders so as to arrive at a price having the lowest buy order price equal to or greater than the nearest sell order price.

Such an operation could in theory be done without the need for any automatic aids but in practice needs to be automatically computed. Mr. Nymeyer envisaged the making of the comparison and the determination of the price with the aid of a computer and so arrived at a system involving in the language of claim 1:

> 1. "A data handling system suitable for establishing prices for a given kind of fungible goods as hereinbefore defined in an auction market as hereinbefore defined, comprising data storing means suitable for storing data representing buy orders for the goods and representing sell orders for the goods, order entering means suitable for entering data representative of individual buy and sell orders including price information in said data storage means, comparing means which in use read out and compare the prices of buy and sell orders from the data storage means, by pairs chosen by progressing sequentially and simultaneously through a descending sequence of the buy orders and an ascending sequence of the sell orders by price, and means arranged to be controlled by said comparing means so as to select the price at which the goods are to be sold in dependence on the price or prices of the last compatible pair of orders which are matched and so as to select each paid of said buy and sell orders to be executed as a sale at a transaction price".

The question is whether this is an invention within the definition to be found in section 101 of the Act which, together with section 6 of the statute or monopolies, is to

be found set out at page 5 of the Decision. The question is whether the data handling system of claim 1 is a manner of new manufacture. These words have over the years been considered and reconsidered in a great many authorities. Counsel for IBM of course accepted that a data handling system, being an apparatus having components which carry out the functions required by claim 1 is a manner of manufacture. His fundamental objection was that in the view of IBM claim 1 covers, inter alia, a standard computer and accordingly in its present form cannot be said to be directed to a manner of new manufacture.

We were not taken through the body of the specification but counsel for IBM told us, and counsel for Mr. Nymeyer did not dissent, that the specification does envisage the use of a special comparator as part of the mechanism of the computer and it is conceded that if claim 1 or any other claim were limited to a computer embodying such a special comparator the objection upon the ground advanced would not be open. He said also, however, and counsel for Mr. Nymeyer again concurred, that at least one of the standard computers made and sold by IBM would be capable of storing the relevant data, making the necessary comparison and selecting the appropriate price if it were programmed to do this.

Now IBM do not on this application dispute the novelty of Mr. Nymeyer's concept but they say, and in our view rightly, that his idea of selecting a price by making a comparison of buying orders in descending order and selling orders in ascending order is not a manner of manufacture. They go further, however, and say that even on the assumption that the idea is new and not obvious it does not become a manner of manufacture if you do no more than call in the aid of an ordinary computer to do the work for you.

It was not suggested on Mr. Nymeyer's side that his idea could be the subject of patent protection. The authorities

to which we were referred show clearly that you cannot get protection for a mere idea and we need not refer to them.

If claim 1 on its true construction protects Mr. Nymeyer's business scheme however carried out it must be bad. If it can be so construed as to cover no more than a standard IBM computer it must be bad. We do not doubt that the standard IBM computer is capable of storing the relevant data (buying orders and selling orders). We do not doubt that the standard computer is capable of making the relevant comparisons. Indeed the specification of the patent seems to acknowledge that comparisons of this kind are a standard operation (see page 16 lines 85-89). We do not doubt that the standard computer can make the relevant selection but it is agreed that it can only carry out these operations when it is programmed to do this. The claim only covers a system in which there are means arranged to be controlled by the comparing means so as to select the price. If a novel comparator is used in the computer to exercise the necessary control no objection can be taken. If there is no special comparator then in our view the claim on its true construction still only covers a computer when it is programmed to produce the required result and does not cover a standard computer as such. As we understand it, a programme is a series of instructions which are fed to the other equipment in the data processing system to produce a desired result. It is possible to have a computer in which a number of different programmes are stored to be used as and when required. Alternatively a particular programme may be fed into a computer from outside. These programmes, written in a language the computer can understand, have taken different physical forms. These forms have included punched cards, punched tape, printed directions which can be optically scanned and now, more commonly, magnetic information stored on tape, wire or drums. It is not suggested that before Mr. Nymeyer came along there ever had been a computer programmed

to carry out the operations required in conducting his system. The Superintending Examiner has found, and this we entirely accept, that once Mr. Nymeyer conceived his idea any competent computer programmer could have told him how to programme a standard computer so as to produce the desired result. As matters stand, however, until Mr. Nymeyer came along there was no reason to suppose that anyone would have thought of writing the appropriate programme and building it into a computer or otherwise putting it into a physical form suitable for use with a standard computer.

A computer programmed to carry out Mr. Nymeyer's system must we think be considered as being an apparatus having novel characteristics but IBM say that in as much as it can be said that by the introduction of this new programme a change may have been brought about this is not a change in manufacture. Counsel for IBM put it in this way that such "newness" as there may be is purely intellectual. This cannot in our view be right. There must be different holes in the card or different magnetic patterns on the tape, or some other automatic control imposed to ensure that the computer carries out the particular operation required.

We must turn now to certain recent authorities touching the question of patentability of improvements relating to data processing. In *Slee & Harris's Application* (1966 R.P.C. 195) a claim to a method of operating a computer with a programme involving iterations characterised in that succeeding iterations were initiated before completion of the previous iteration was rejected, but a claim to a computer programmed to produce this result was accepted as was a claim to means for controlling a computer (programming means) to produce this result. The decision was a decision of the Patent Office. In it the Superintending Examiner observes, in relation to the claim to a computer programmed to produce the result, "It is directed to a ma-

chine which has been set into such a condition that it can proceed to solve a particular programme by undertaking a series of specified steps. It may be regarded as a machine which has been temporarily modified. No objection should in my view be raised by the Comptroller against such a claim on the ground that the invention concerned is not within the statutory definition". He further observes on the same page, page 198 of the Report, in relation to the claim to programming means, "The means claimed is more than a record of a programme, it is an integer which physically co-operates with a computer to control the latter to operate in a certain way. The means can, therefore, be likened to a cam shaped according to certain formulae so that, when fixed into a machine, it controls the latter in a certain way".

Badger Company Incorporated's Application (1970 R.P.C. 36) was a case in the Patents Appeal Tribunal. The claim under consideration was directed to a method of producing a drawing with the aid of a computer involving a series of steps as set out in the decision of Lloyd-Jacob, J. at page 39, line 33. Lloyd-Jacob, J. held that the claim as originally framed was not directed to a manner of new manufacture but suggested that it could be re-drafted in the form of a claim to a process for conditioning the operation of a computer or a computer of known type arranged to produce the solution and certain claims as finally accepted are to be found set at page 41 of the report.

In the same volume in *Gever's Application* reported at page 91 the Tribunal allowed a claim to:

> "A data processing apparatus for recording the registration of word marks by means of mechanographic supports arranged in a filing zone, the said word marks being transcribed by replacing certain letters or combinations of letters when occurring therein by other letters or combinations of letters"—that is to say, the letter Y by the letter I, the letters CI by the letters SI and any double letters by a single letter—"the said

already stated, there can only be one answer to the question, namely, that it is a manner of manufacture and I so hold.

"The second point which arises on the proposed claims is whether a punched card having holes in it embodying information according to the claimed rules of transcription can also be properly claimed as a manner of manufacture. To my mind such a card is no different from the "means" in *Slee & Harris's Application* or from the cam therein referred to at page 198, line 45. It is to my mind clear that a newly invented lathe, the tool of which is constrained by a cam to take a certain path in cutting, for example, a gear wheel, is a manner of manufacture. It is equally clear that such a cam could be made the subject of a subsidiary claim in a patent for the lathe. As sold, or as it lies on the table, of course such a cam could only have a potential usefulness, but it seems to be that it would be quite right that a claim should be able to be made to such a cam because it is in the circumstances envisaged novel and inventive and produces a useful result when it is placed in the machine for which it is designed. It is exactly analogous to, for example, a new type of carburettor which is necessary for the motor car for which it is intended. It seems to me impossible to argue successfully that such a carburettor or such a cam is not a manner of manufacture within the section.

"I cannot see that a punched card is in any different position. If the card was in fact shaped so that it could be used in place of a metal cam its contour being followed by some sensing device, it seems there could be little argument. How can it make any difference that the card is punched instead of being contoured? It is to my mind properly to be regarded as a manner of manufacture since it is shaped in a particular way,

namely, by having holes in it at certain specified positions which ensure that it is capable when placed in its machine of controlling that machine in accordance with pre-determined directions. In this respect it seems to me to differ from a card which is merely printed and which is intended to convey information to the human eye or mind but which is not intended to be ancillary to some machine being specially shaped or constructed for that purpose".

In *Burroughs Corporation (Perkins') Application* 1974 R.P.C. 147 the Patents Appeal Tribunal sitting *in banc* accepted claims in these terms:

"8. A method of transmitting data over a communication link between a central processor and designatable ones of a plurality of addressable remote data terminals coupled by said communication link to said central processor, said method comprising the steps of generating a sequence of inquiry messages at said central data processors, transmitting said inquiry messages from said central processor to said remote data terminals via said communication link in a multidrop mode, storing terminal address data at each remote terminal, said terminal address data designating the address of the remote data terminal at which it is stored, temporarily storing received inquiry messages at each of said data terminals receiving said inquiry messages, withdrawing from storage at each remote data terminal receiving an inquiry message the terminal address data designating the address of that data terminal, comparing said terminal address data with an address portion of said inquiry message at each remote data terminal, receiving said inquiry message to determine whether such received message is addressed to the terminal receiving such inquiry message enabling the addressed data terminal to respond to said inquiry message, and selectively changing the ter-

minal address data stored at at least one of the said remote data terminals to selectively inhibit that data terminal from recognising an inquiry message having an address portion corresponding to the original terminal address data of said data terminal before said terminal address data was altered.

"9. A method as claimed in claim 8 which includes the steps of recognising the failure of an addressed data terminal to respond to a poll-select type inquiry message addressed to it, and changing the poll-select type inquiry message whenever an addressed data terminal fails to respond to an inquiry message of one type addressed to it.

"10. A method as claimed in claim 8, which includes the step of transmitting a control character from a data terminal to said central processor whenever said data terminal receives an inquiry message addressed to it and its normal terminal address data has been modified.

At this stage it had become the Office practice to allow claims to computers programmed in a particular way and also to computer programmes embodied in such physical forms as punched cards or tape. The objection to these particular claims was that, being in form directed to a method of transmitting data or for controlling a computer, as opposed to claims for a method of programming a computer, the product to which they must be considered as being directed could be said to be no more than intellectual information.

We do not propose to review again the authorities referred to in the judgment in *Burroughs' Application* many of which were referred to on the present hearing. We remain of the opinion which is to be found expressed on page 160.

"If a claim, whatever words are used, namely, whether the claim is, for example for a method of transmitting

> data . . .,' 'A method of controlling a system of computers' or 'a method of operating or programming a computer . . .', is clearly directed to a method involving the use of appratus modified or programmed to operate in a new way, as the present claims are, it should be accepted".

We proceed upon the basis that the only thing that was novel in connection with the present application was Mr. Nymeyer's concept of the way in which a price could be fixed, but what he seeks to claim as a manner of new manufacture is a method involving operating or controlling a computer in which, so far as the contested claims are concerned, the computer is programmed in a particular way or programmes in physical form to control a computer so that it will operate in accordance with his method. The method is embodied in the programme and in the apparatus in physical form and in our view the Superintending Examiner was right in concluding that the claims should be allowed to proceed. It certainly cannot be said of any of these claims that under the old law they are clearly not directed to a manner of new manufacture.

We were additionally referred to two cases in the U.S. Supreme Court. In the first of these *Gottschalk* v. *Benson* 1972 409 U.S. page 63 Mr. Justice Douglas, who gave the opinion of the Court, observes at page 71:

> "It is conceded that one may not patent an idea. But in practical effect that would be the result if the formula for converting BCD numerals to pure binary numerals were patented in this case. The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.

> It may be that the patent laws should be extended to cover these programs, a policy matter on which we are not competent to speak."

In the case before us there is no attempt to patent a formula or its equivalent. The claims are directed to apparatus arranged to operate in a particular way.

In *Parker* v. *Flook* 98 S.Ct., page 2522 the Court was divided as to the extent to which a novel feature in the form of a mathematical formula or algorithm could be protected. Mr. Justice Stevens observes, in giving the majority decision of the Supreme Court, that the Supreme Court was considering section 101 of the U.S. Patent Code and it is plain it was not considering the United Kingdom Act of 1949. He specifically observes: "Respondent's process is unpatentable under section 101 not because it contains a mathematical algorithm as one component, but because once that algorithm is assumed to be within the prior art the application considered as a whole contains no patentable invention. Even though a phenomenon of nature or mathematical formula may be well known, an inventive application of the principle may be patented. Conversely the discovery of such a phenomenon cannot support a patent unless there is some other inventive concept in its application".

We agree with the Superintending Examiner that under the Act of 1949 and the decided cases the law is that an inventive concept, if novel, can be patented to the extent that claims can be framed directed to an embodiment of the concept in some apparatus or process of manufacture.

The appeal must stand dismissed.

MR. EVERINGTON: My lords, I ask for costs. By tradition, going back to, at any rate, the last century, and the practice of the law officers, the costs awarded are not on an indemnity basis but a contribution towards the costs. The only

thing I would say in this case is that the patentee here is an individual and this is, as my learned friend has said, quite clearly a test case by a large corporation and in those circumstances I do ask your lordships to make a generous contribution.

MR. PRESCOTT: First of all, to deal with the question of costs, it is my understanding that our respective clients agreed beforehand that if IBM won they would not ask for costs at all. We are astonished, however, to hear that they are asking for indemnity costs in the event of us losing. I would simply observe that this is an ordinary case in the Patent Appeal Tribunal and your lordship should be invited to proceed in the usual way in making a contribution.

MR. JUSTICE WHITFORD: I did not understand Mr. Everington to ask for indemnity costs. I thought he asked for a generous contribution.

MR. PRESCOTT: My lord, it is a case which is no more difficult or involved, in fact less so because of the sparsity of the evidence required. It is a case which has not taken up much time either here or below.

MR. JUSTICE GRAHAM: What happened in the court below?

MR. EVERINGTON: £150, my lord.

MR. PRESCOTT: We would ask for the normal sort of scale in these case and that it should not be treated differently.

MR. JUSTICE GRAHAM: We think the right order is £250 costs.

MR. PRESCOTT: I have an application which I am instructed to make for leave to appeal to the Court of Appeal. May I make two points in connection with that. First of all, this is quite a different kind of case from the previous computer programming cases which have been before this tribunal.

MR. JUSTICE GRAHAM: Why do you say that?

MR. PRESCOTT: We are here not concerned, as I think all the other cases were, with matters of form, in other words, whether it makes any difference to frame or claim a machine when programming as opposed to a programme. I think we conceded at the outset that we did not care how it was put, a machine when programmed or a card full of punched holes, it is all the same. The point of substance we make is this: there is, with respect, no attempt here to distinguish between two kinds of "newness" in punched cards, to take your lordship's illustration. Your lordships made the point that if you have a punched card which has holes in it and that pattern of holes is novel, then you have got a novel article of manufacture and a manner of new manufacture. My lords, there must be a distinction between a punched card with holes in its which is new which is intended to feed a musical box and play a new tune and whose only novelty lies or derives from the novelty of the tune, and a punched card which might serve, for example, to control a machine to produce a new kind of shaft or other article of manufacture.

MR. JUSTICE GRAHAM: You say there must be a distinction between those two?

MR. PRESCOTT: My lord, I submit so; otherwise the effect of your lordships decision would be this, that all you have to do is to come before the Patent Office and say, "I have a new tune which I thought up yesterday. I want to make it suitable for a musical box. Here is my punched card suitable for fitting into a standard musical box. Nothing like this punched card has ever been seen before, it is new, non-obvious, an article of manufacture and therefore I demand to patent it". It goes further than that, because by parity of reasoning we must extend the protection to have any good to the actual grooves in a gramophone record.

MR. JUSTICE WHITFORD: When you mention a musical box it is a box which is intended to function in the same old way.

MR. PRESCOTT: In the same old way but in a totally new manner; so perhaps now we are going to what we consider the distinction is. The point is there and I will not elaborate it here, because after all your lordships have given a long and reasoned decision. I do submit it is a point of first class capital importance and leave should be granted.

MR. JUSTICE GRAHAM: The trouble is that this is under the old law. It is a pity in a way that we are not acting under the new law. No doubt you will in the next case.

MR. PRESCOTT: The new law may well have effect for the next 20 years.

MR. JUSTICE GRAHAM: Yes, I know, but this is the old law.

MR. PRESCOTT: I am sorry, the old law may have effect for the next 20 years. It may proceed some way into the future.

MR. JUSTICE GRAHAM: What do you say, Mr. Everington?

MR. EVERINGTON: As your lordship points out it is only a question under the old law. The old law was tolerably clear and established by the cases your lordships referred to. In my submission this really does not carry the matter any further in this case and simply reaffirms what has already been settled as the old law.

MR. JUSTICE WHITFORD: None of it has ever gone to the court of appeal. It is going to have effect probably to a number of cases.

MR. EVERINGTON: Yes, my lord.

MR. JUSTICE WHITFORD: So on those, if they ever come before the courts, the decision of the Appeals Tribunal will not in any sense be conclusive certainly.

MR. EVERINGTON: That is right, my lord.

MR. JUSTICE GRAHAM: I think we can give you leave to appeal.

MR. EVERINGTON: May I just say this on the question of costs here. As I pointed out my client is an individual, and the costs in the Court of Appeal will be the ordinary costs awarded by the Court of Appeal. My lord, as this is a test case, and the case of a large company taking an individual up before the Court of Appeal, I would ask your lordship to consider whether leave should not be conditional upon the applicants paying the costs in any event.

MR. PRESCOTT: I understood your lordships to have given leave.

MR. JUSTICE GRAHAM: That argument had not been put up. The order is not finalised yet.

MR. PRESCOTT: There are two aspects on this. As I said earlier IBM had already decided even if it won not to ask for their costs here because we are an international corporation of very great stature and do not want to be seen to be pushing people around. It is one thing to say, if one likes, out of a sense of generosity one should not do that, but it is another thing to be treated as a matter of law——

MR. JUSTICE GRAHAM: It is not a question of a matter of law but what is the right thing to do in the circumstances.

MR. PRESCOTT: There is no reason why we, in order to protect what we conceive to be our rights, that we should be treated any different from any other litigant.

MR. JUSTICE WHITFORD: All right you get leave and nothing is said as to costs, and maybe Mr. Nymeyer decides he cannot appear before the Court of Appeal because of the burden of costs. I think it would be unfortunate in a case of this kind which may vitally affect the interests of IBM in wholly different cases that it should be argued before

the Court of Appeal without the assistance of counsel on the other side.

MR. PRESCOTT: Your lordship, if I may say so, is absolutely right. I wonder if your lordships would consider making a recommendation to suitable quarters in such a case that it might be a case for an amicus to assist the court in the event of that situation transpiring. One must have regard to the distinction as to what might happen in practice. I dare say in practice we would be horrified if he threatened to drop the case because of lack of funds, but in reality as we are here we ask not to be treated differently to anybody else.

MR. JUSTICE GRAHAM: I think we will adjourn for five minutes.

(*Their lordships left the bench.*)

MR. JUSTICE GRAHAM: The order that we make is as follows: we do give leave to appeal and it will be appreciated we can not in any way tie the hands of the Court of Appeal as to what they may think is the right course to take. This is obviously an important case from the point of view of IBM and we recognize that probably the first opportunity they have had of going to the Court of Appeal in order to get the matter fully tested, but we do hope that they will consider their position as a result of today with a view to making it clear to Mr. Nymeyer that in the event of their prosecuting the matter in the Court of Appeal they will not ask for an order as to costs. In any event, if Mr. Nymeyer feels he is unable to take part in the proceedings in the Court of Appeal we think that IBM should make it clear to the Court of Appeal what the position is and ask them whether or not they would like to make an order that they have an amicus curie to assist them in the Court of Appeal. We appreciate that this is a matter which ought to be argued fully on both sides in order to arrive at a proper decision. Is that clear?

MR. PRESCOTT: That is clear. Although we do not have definite instructions, therefore I cannot definitely commit my clients, it would not surprise me in the slightest if your lordships' comments fall on receptive ground.

MR. JUSTICE GRAHAM: That is what we rather expected you might say from people of your calibre.

MR. PRESCOTT: If your lordship pleases.

APPENDIX B

FIGURES 7 AND 8 FROM THE
SHERWOOD PATENT APPLICATION

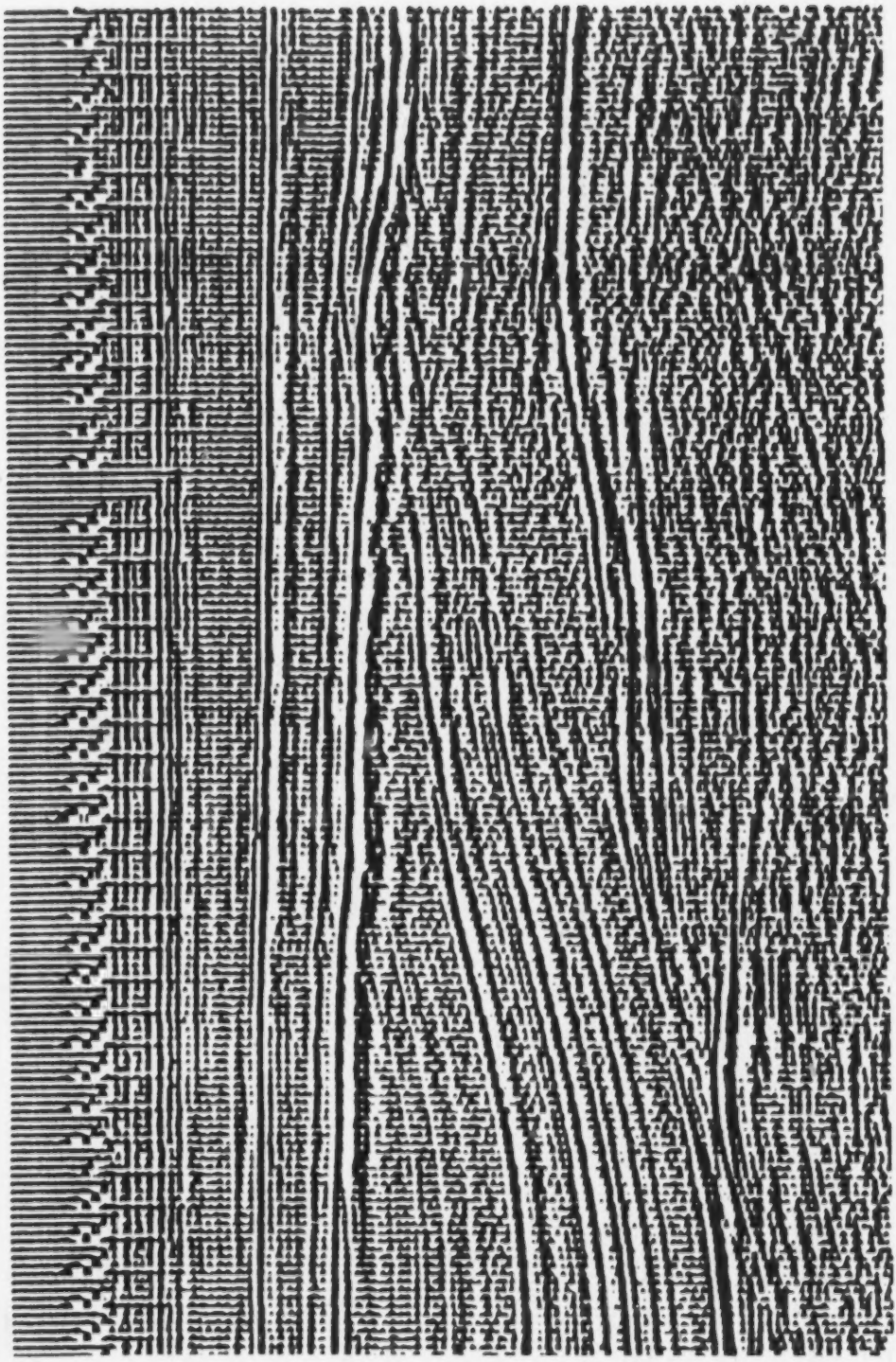


FIG. 7

INVENTOR
JOHN W. C. SHERWOOD
BY George W. Wasson
Ralph L. Freeland Jr.
ATTORNEYS

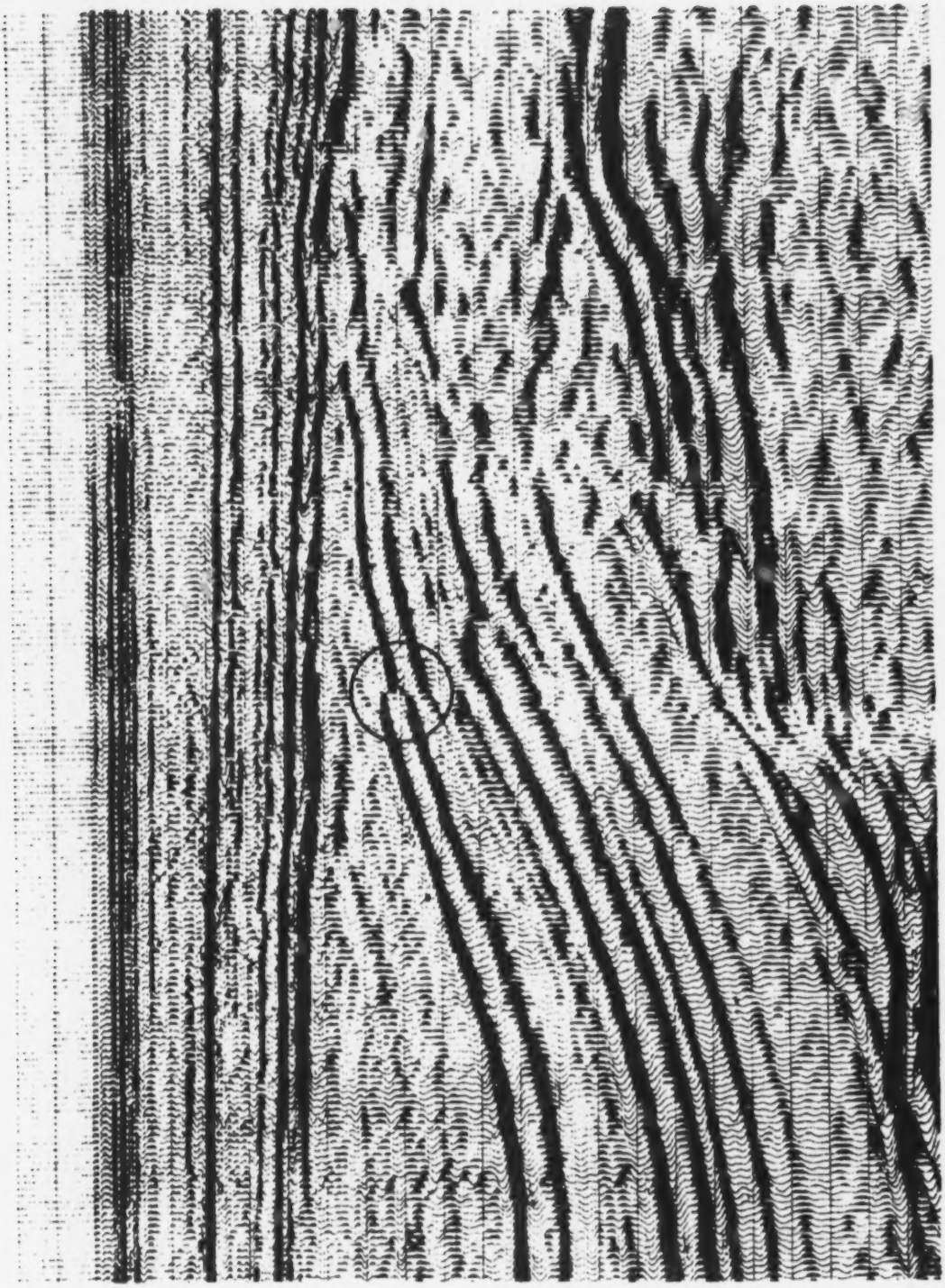


FIG. 8

INVENTOR
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see 7 9

8 5